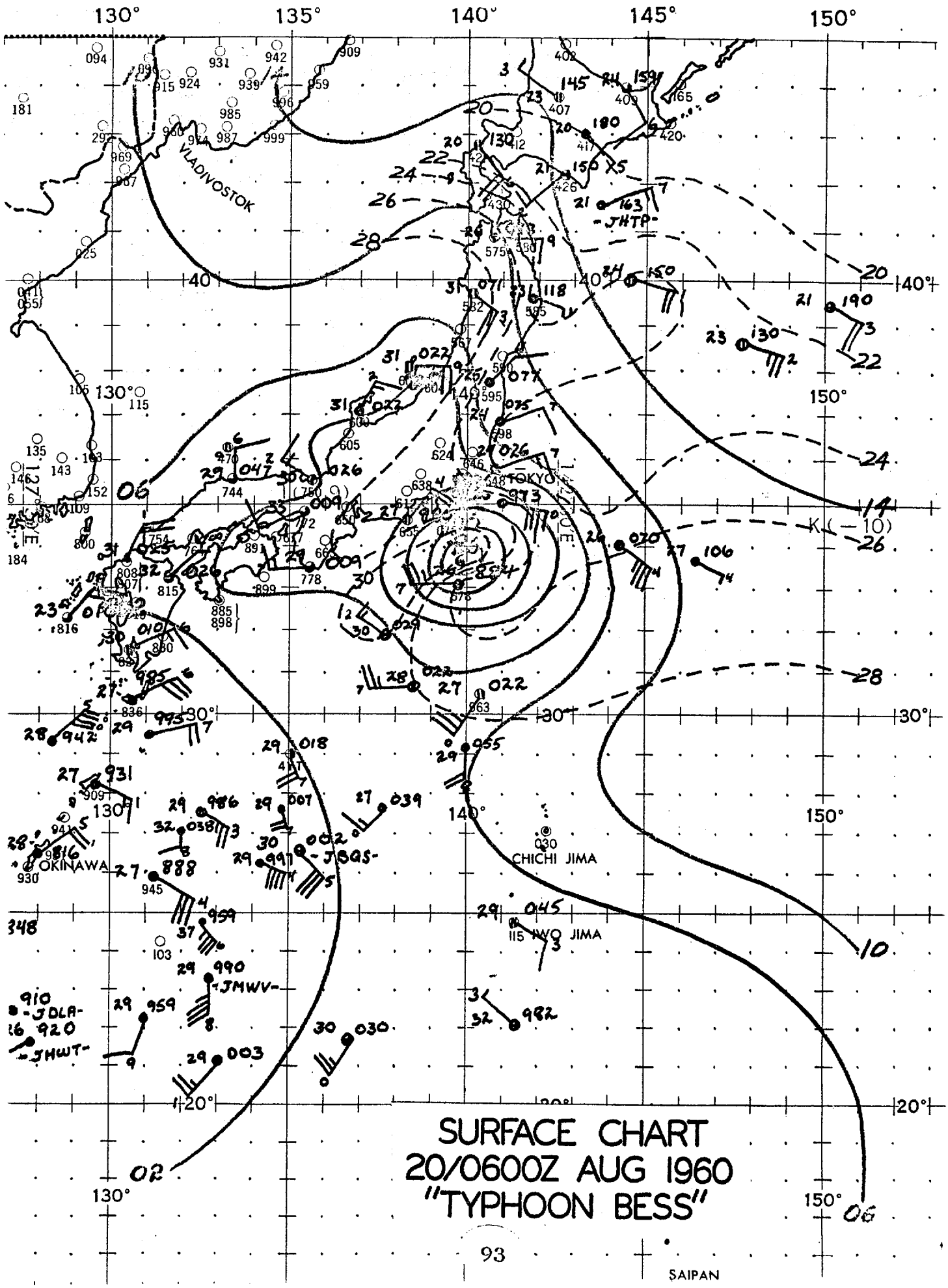
K. TYPHOON BESS (160900Z-251200Z AUGUST 1960)

The first indication of Typhoon BESS was a small circulation on the 130600Z surface chart about 750 mi to the ESE of T.S. AGNES and about 375 mi NW of Guam. A second cyclone, later to become Typhoon CARMEN, developed simultaneously with BESS even closer to AGNES. As these two cyclones developed, the trough extending to the SE from AGNES gradually assumed an E-W orientation and by 141200Z extended 3,000 mi to the E (from 100E to 146E) along latitude 22N. Upon becoming parallel latitudinally the trough began to intensify, and on the 141200Z surface chart the pressure in the trough averaged 1002 mb (an average of all isobars crossing the trough line from 100E to 146E). By 151200Z the trough's pressure averaged 999 mb. During the period 130600Z to 160600Z the depression that was to become BESS moved slowly, intensified with the trough, and increased to tropical storm intensity at 160900Z when the first warning was issued. BESS then moved on a track of 310 degrees to a point 115 mi NNE of Iwo Jima at 180600Z, and at 181200Z to a point 30 mi SW of Peel Island. It then curved to the NNW and passed 40 mi WSW of Tori Shima at 190900Z. BESS was upgraded to a typhoon at 200000Z, although post analysis indicates that it reached typhoon intensity at approximately 191800Z. As a typhoon it passed 25 mi E of Miyake Jima, an island 100 mi S of Tokyo, at 200900Z, and within 25 mi of the main island of Honshu while moving to the NE. At 37N 145E BESS commenced moving on a track of 100 degrees. The typhoon continued along this track until 221800Z when it began reversing direction, moving clockwise and forming a loop. The N-S axis of the loop was 50 mi and the E-W axis 175 mi. BESS intersected the original track at 35.8N 152.0E while moving WNW. Typhoon BESS was downgraded to a tropical storm at 240600Z, and the final warning was issued at 251200Z. Post analysis indicates that BESS should have been downgraded to a tropical storm at approximately 230600Z. Typhoon BESS moved 2200 mi in 9 days and 3 hours at an average speed of 10 kts or 243 mi per day.

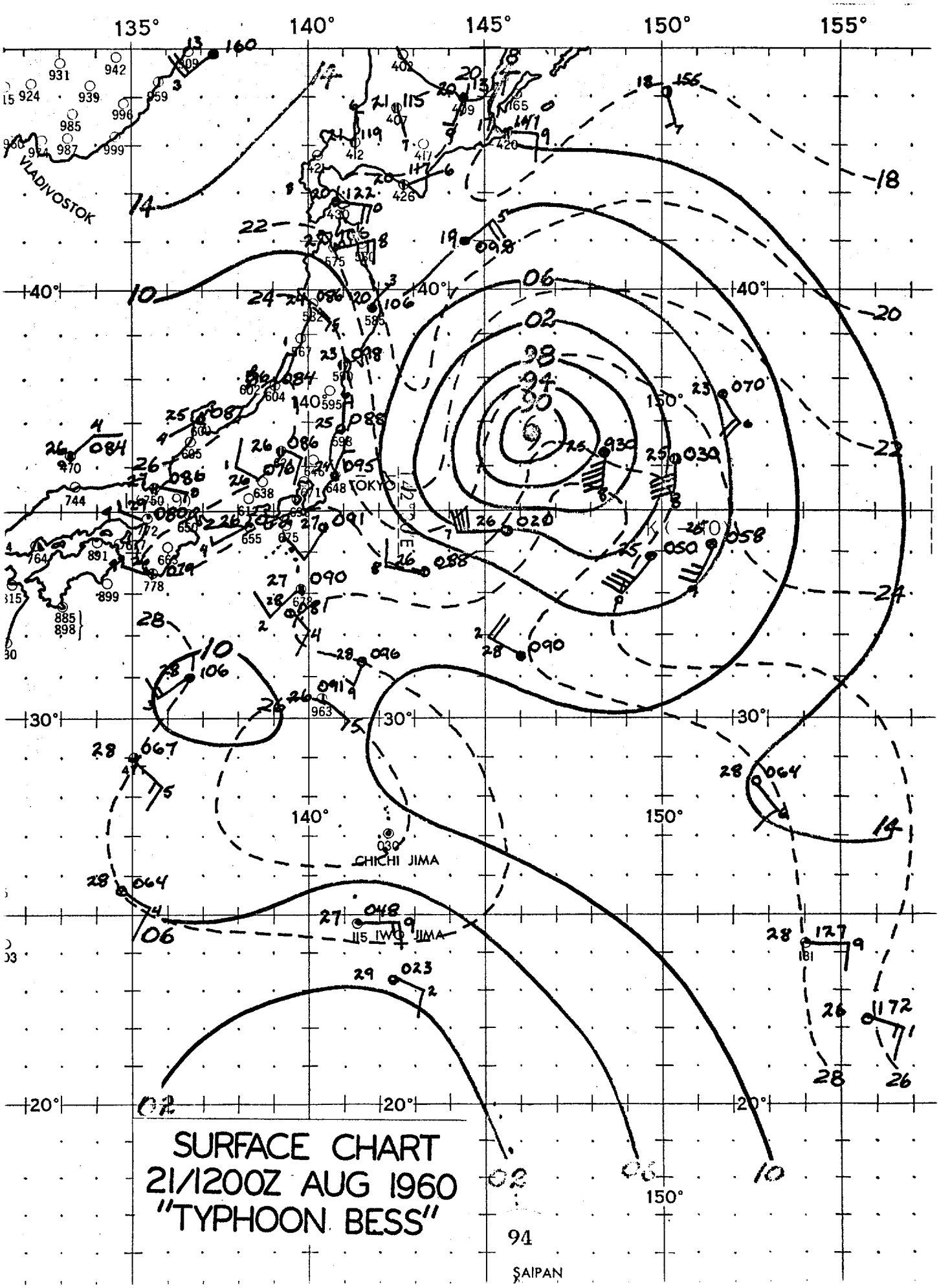
By 161200Z, the large surface trough, previously discussed, extended between 20 and 25 degrees N and from approximately 100 to 152E. The ridge line at this time was N of 40N from Japan to Hawaii, and the pressure along the equator averaged approximately 1010 mb - the contribution of a series of small highs just N of the equator. The easterlies, disturbed more than usual, lacked the normally smooth pattern. From 20S to 30N easterlies existed from E of Hawaii to 155E. From 100E to 150E westerlies of substantial strength existed from

near the equator to 20N. During the period that warnings were issued on BESS the following typhoons and tropical storms existed: T.S. AGNES, Typhoon CARMEN, Typhoon ELAINE, Typhoon DELLA, and T.S. FAYE (later to become a typhoon).

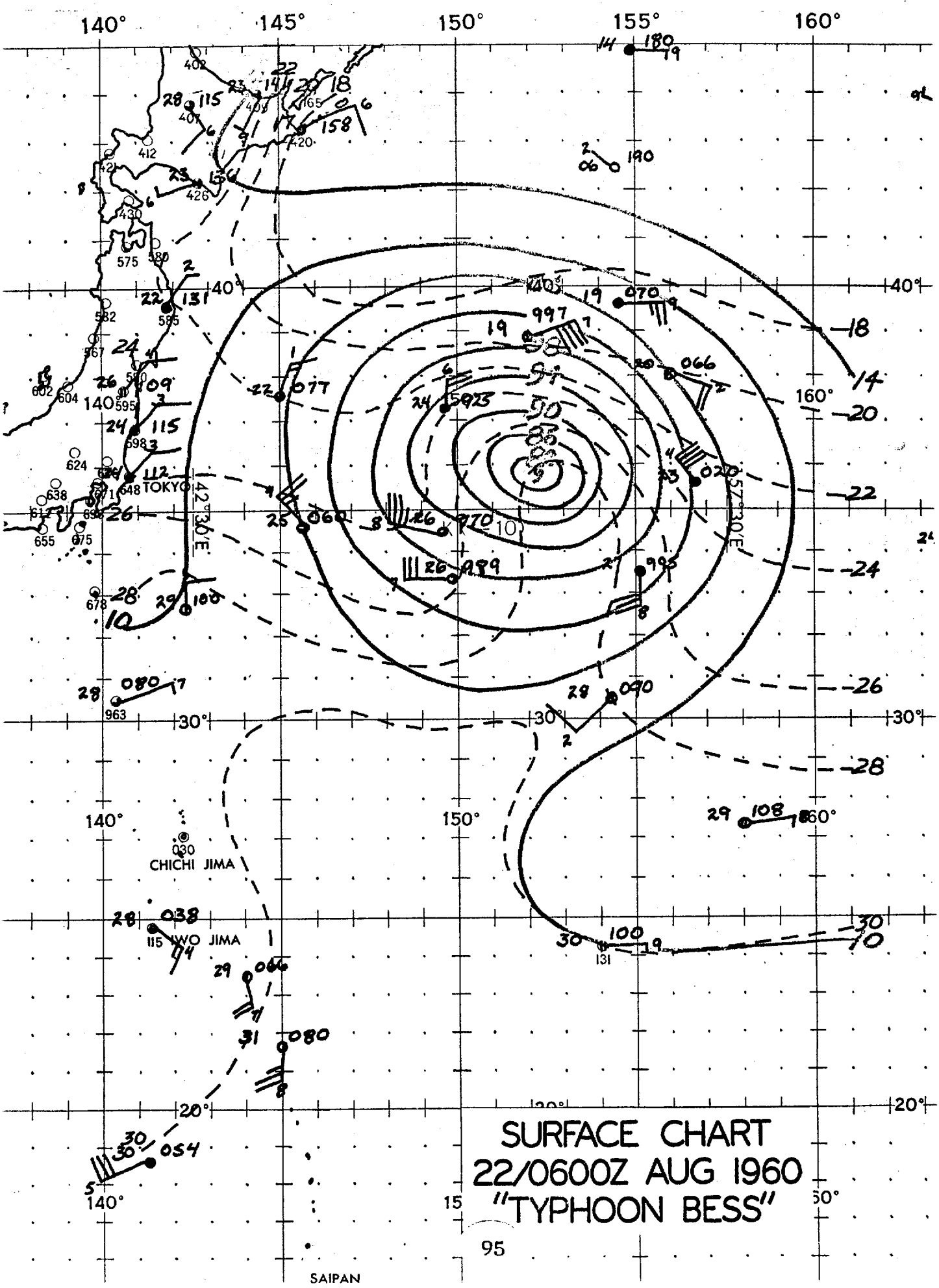
There are two features about Typhoon BESS that appear unusual. The first is the loop that occurred. A loop was not uncommon during the 1960 Typhoon Season, however, no typhoons looped in 1959, and only one tropical storm and one typhoon looped during the 1958 season. Coincidental with the arrival of BESS off the E coast of Japan, an upper air trough, best pictured on the 300 mb chart, developed between a high centered over southern Japan and one at 28N 150E. The easternmost high moved further SE and the trough deepened rapidly at a point almost over Typhoon BESS. Between 221200Z and 231200Z a closed circulation formed in this trough at a point S of the surface position of BESS. This circulation then caused BESS to commence moving in a westerly direction. BESS was then influenced by the circulation around a deep low near 45N 128E which caused it to move to the N after 250600Z. The other feature is the continued life of BESS after 201200Z. It is believed that BESS would have become extratropical after 201200Z had it not been for the circulation about T.S. DELLA and later around T.S. FAYE transporting warm air into the vicinity of Typhoon BESS, prolonging its life about 4 days. During this period, there was warm air at the center from the surface through the 500 mb level. Included are 4 surface charts with pressure and temperature analyses portraying the conditions at that time. Limited data precludes a more detailed examination.

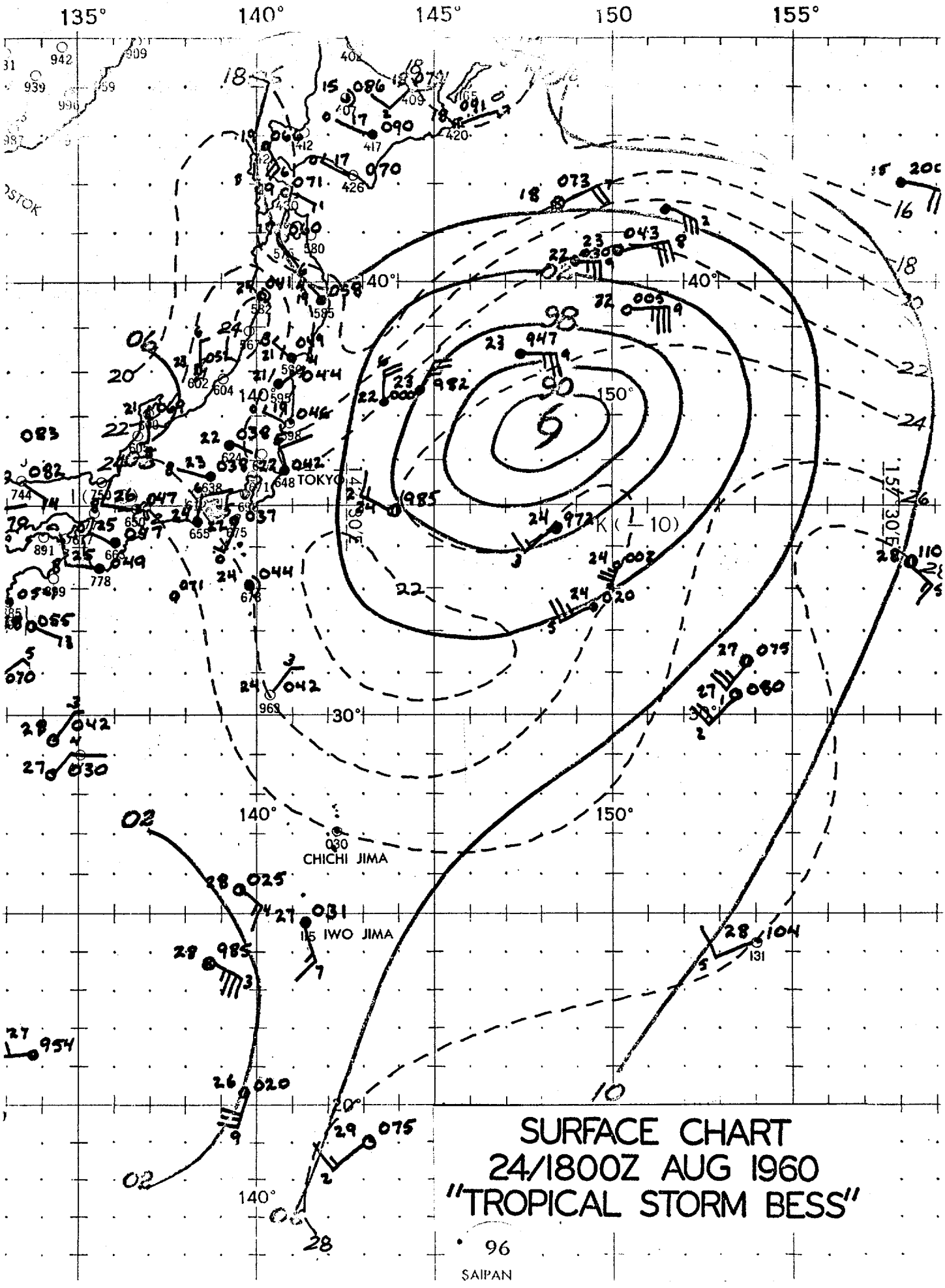


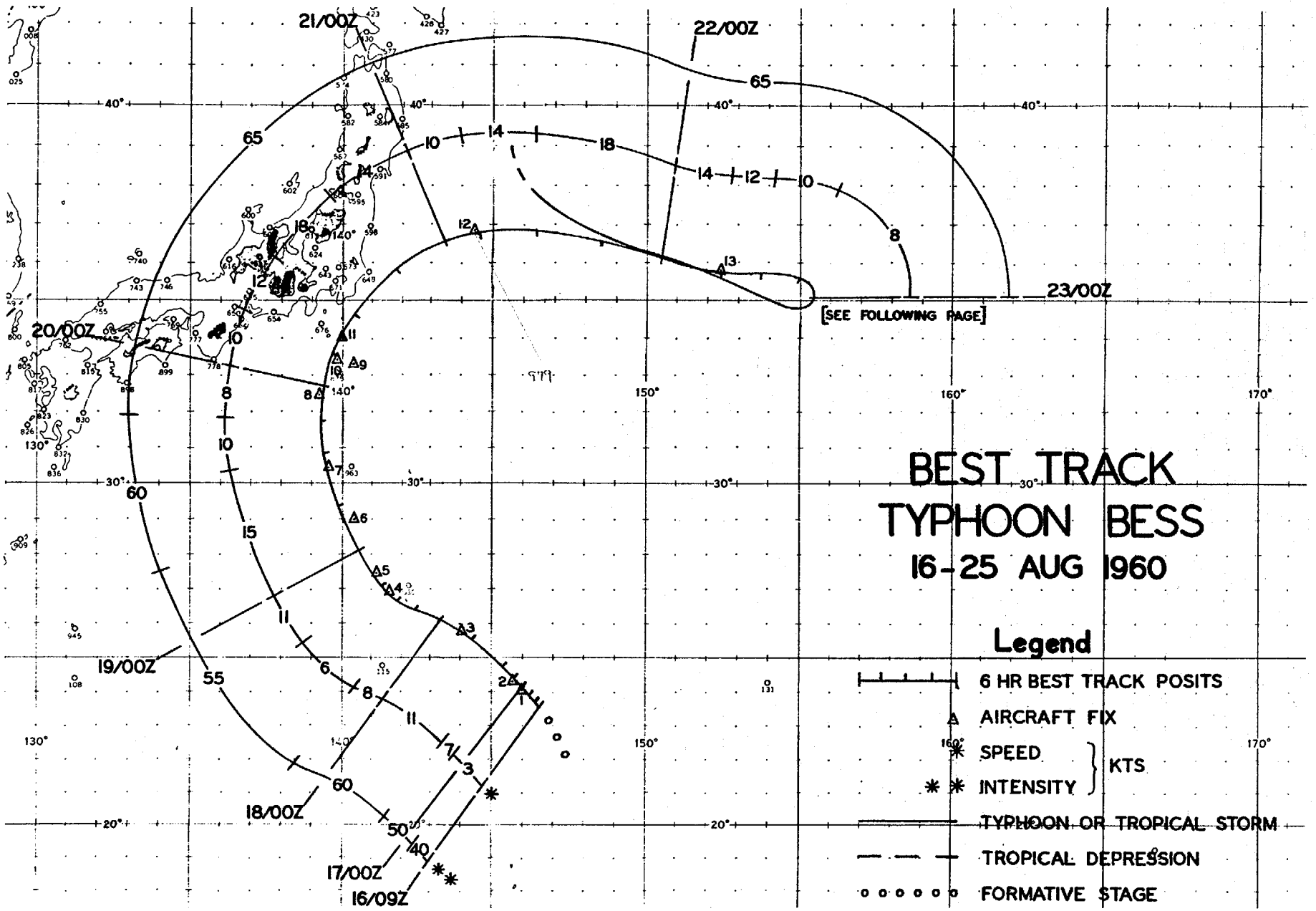
SURFACE CHART
20/0600Z AUG 1960
"TYPHOON BESS"

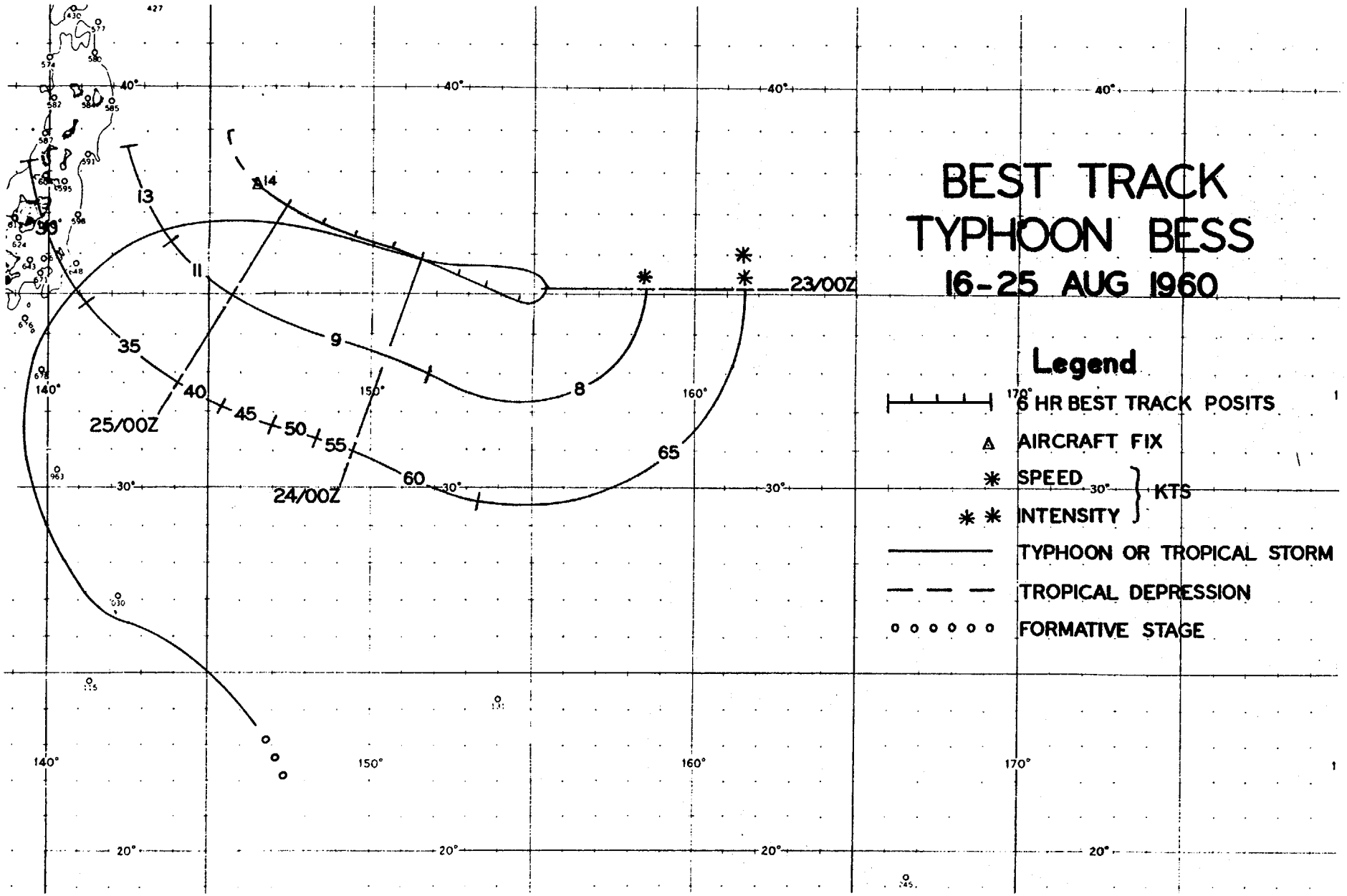


SURFACE CHART
21/1200Z AUG 1960
"TYPHOON BESS"


140°
145°
150°
155°
160°
40°
30°
20°
TOKYO
CHICHI JIMA
IWO JIMA
SAIPAN
SURFACE CHART
22/0600Z AUG 1960
"TYPHOON BESS"


135°
140°
145°
150
155°
40°
30°
20°
TOKYO
CHICHI JIMA
IWO JIMA
SAIPAN
SURFACE CHART
24/1800Z AUG 1960
"TROPICAL STORM BESS"


21/00Z
22/00Z
23/00Z
20/00Z
19/00Z
18/00Z
17/00Z
16/09Z
[SEE FOLLOWING PAGE]
BEST TRACK
TYPHOON BESS
16-25 AUG 1960
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
KTS
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE


BEST TRACK
TYPHOON BESS
16-25 AUG 1960
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
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TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
23/00Z
25/00Z
24/00Z
13
14
11
9
8
35
40
45
50
55
60
65
40°
30°
20°
140°
150°
160°
170°

RECONNAISSANCE AIRCRAFT FIXES - TYPHOON BESS

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MIN SLP MBS	MAX SFC WND	MIN 700MB HGT	MAX 700MB WND	700MB TT/Td (°C)	EYE CHARACTERISTICS
1	170010Z	24.1N	145.9E	56-P-20	980	45	9830 (990)	40	12/10	CIRC DIA 05 MI WELL DEFINED
2	170600Z	24.3N	145.8E	56-P-05	990	55	9810 (987)	50	13/10	CIRC DIA 05 MI OPEN W
3	171948Z	25.7N	144.0E	56-P-08	958	- -	9780 (988)	30	10/08	CIRC DIA 12 MI
4	180800Z	26.9N	141.6E	56-P-05	990	35	9850 (990)	35	10/07	ELLIP ORIEN N-S DIFFUSE
5	182015Z	27.4N	141.1E	56-P-05	984	45	9640 (983)	35	13/10	CIRC DIA 10 MI OPEN S
6	190350Z	29.0N	140.3E	VW1-R-10	- -	- -	- - -	- -	- - -	CIRC DIA 12 MI
7	190935Z	30.4N	139.6E	56-P-01	942	55	9670 (974)	51	16/12	CIRC DIA 16 MI OPEN S
8	192155Z	32.4N	139.1E	56-P-02	980	55	9650 (983)	60	18/--	CIRC DIA 15 MI
9	200203Z	33.4N	140.3E	USN-R-01	- -	- -	- - -	- -	- - -	HORSE SHOE EYE 70 MI DIA
10	200515Z	33.3N	139.9E	56-P-02	978	55	9720 (986)	50	18/13	CIRC DIA 20 MI OPEN SE
11	200820Z	34.0N	140.0E	315-----	- -	60	9610 (982)	30	16/--	- - - - - - - - - - - - - - -
12	210500Z	36.9N	144.4E	56------	- -	60	9500 (971)	40	15/--	NO EYE
13	220600Z	35.8N	152.3E	315-P-08	- -	60	- - -	*66	14/--	- - - - - - - - - - - - - - -
14	250509Z	37.7N	146.4E	56-P-04	986	20	- - -	- -	- - -	EXTRATROPICAL

* MAX 500 MB WND

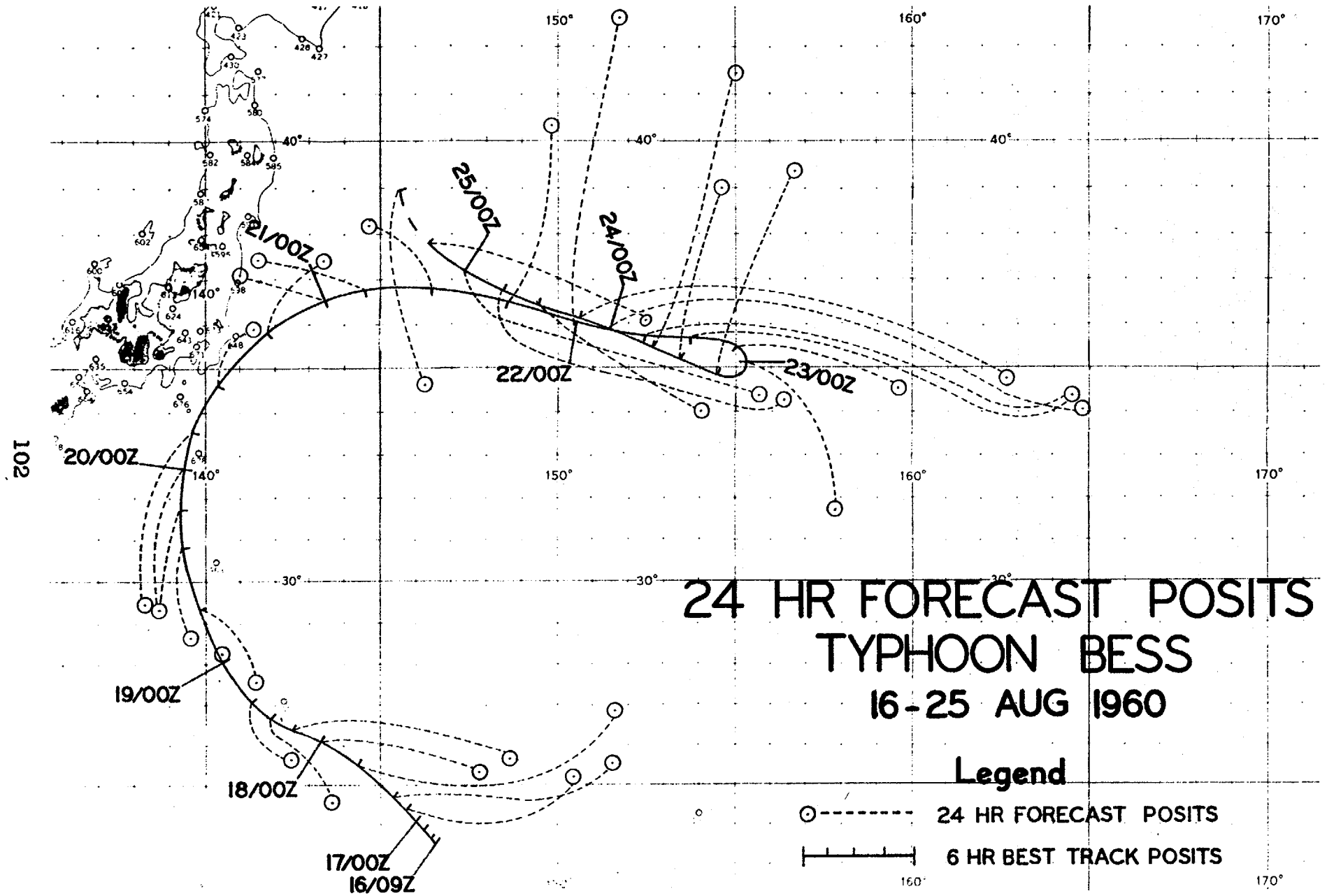
TYPHOON BESS 16-25 AUGUST 1960
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
160900Z	23.5N	146.5E	- - - -	- - - -
161200Z	23.6N	146.4E	- - - -	- - - -
161800Z	23.8N	146.2E	- - - -	- - - -
170000Z	24.1N	146.0E	- - - -	- - - -
170600Z	24.3N	145.8E	079-246	- - - -
171200Z	24.8N	145.3E	082-344	- - - -
171800Z	25.5N	144.3E	078-403	- - - -
180000Z	26.1N	143.2E	102-257	- - - -
180600Z	26.4N	142.5E	097-342	081-688
181200Z	26.7N	141.9E	142-220	079-767
181800Z	27.1N	141.3E	148-101	075-807
190000Z	28.1N	140.6E	301-12	092-520
190600Z	29.4N	139.9E	148-132	105-613
191200Z	30.9N	139.4E	173-135	161-340
191800Z	31.8N	139.2E	190-157	181-312
200000Z	32.7N	139.2E	187-212	198-181
200600Z	33.6N	139.7E	196-254	186-273
201200Z	34.6N	140.5E	065-51	214-298
201800Z	35.9N	141.9E	- - - -	- - - -
210000Z	36.6N	143.4E	- - - -	- - - -
210600Z	36.9N	144.6E	- - - -	- - - -
211200Z	36.9N	146.3E	- - - -	- - - -
211800Z	36.6N	148.5E	- - - -	- - - -
220000Z	36.1N	150.5E	- - - -	- - - -
220600Z	35.8N	152.3E	- - - -	- - - -
221200Z	35.8N	153.8E	- - - -	- - - -
221800Z	35.7N	155.0E	- - - -	- - - -
230000Z	35.1N	155.4E	- - - -	- - - -
230600Z	34.9N	154.5E	- - - -	- - - -
231200Z	35.2N	153.6E	- - - -	- - - -
231800Z	35.5N	152.7E	- - - -	- - - -
240000Z	35.9N	151.6E	- - - -	- - - -
240600Z	36.1N	150.6E	- - - -	- - - -
241200Z	36.4N	149.5E	- - - -	- - - -
241800Z	36.7N	148.4E	- - - -	- - - -

TYPHOON BESS 16-25 AUGUST 1960
POSITION AND FORECAST VERIFICATION DATA (CONT'D)

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG.	DISTANCE	48 HR. ERROR DEG.	DISTANCE
250000Z	37.1N	147.4E	- - - -		- - - -	
250600Z	37.8N	146.3E	- - - -		- - - -	
251200Z	39.0N	145.7E	- - - -		- - - -	

AVERAGE 24 HOUR ERROR 205 MI
AVERAGE 48 HOUR ERROR 480 MI


150°
160°
170°
40°
30°
140°
102
16/09Z
17/00Z
18/00Z
19/00Z
20/00Z
21/00Z
22/00Z
23/00Z
24/00Z
25/00Z
24 HR FORECAST POSITS
TYPHOON BESS
16-25 AUG 1960
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS